

Notes from my herbarium. II.

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NYMPHAEA ODORATA Ait. Sweet-scented water-lily.

The sweet-scented water-lily, whose chief attraction to the lover of nature is its beautiful flower, grows throughout eastern North America, and its praises have long been sung in prose and poetry. To the close observer, however, the flower is but one of many points of interest, and I have taken the greatest pleasure in collecting the plant for my herbarium. Even the best of professional collectors rarely send out in their sets full representations of the immersed parts of this plant. Indeed, it would not be a paying business if they did, for it took me the greater part of an afternoon to prepare satisfactory specimens for my own herbarium.

I spent a portion of July, 1886, in the Old Manse, in Concord, Mass., on the banks of the Concord river, close by the old battle-field. In early July, for some miles on either side of the stream, the water-lilies form a continuous bed of snowy white. I had already collected, elsewhere, the flowers and leaves, not realizing at the time what a small portion of the plant my herbarium would show. I resolved, now, to represent the whole plant, and, so, one pleasant afternoon, I took a boat and a rake, and rowed to a spot where the flowers were not too thick, and the water was about three feet deep. Then, getting the tines of the rake under a thick rootstock, I drew up a complete plant. I made a longitudinal section of the rootstock, keeping about a foot of it in length, and leaving the large terminal bud in place. The consistency of the stock is about that of a green apple. I trimmed the specimen carefully, leaving enough to show all the features, a single flower, a fully-developed leaf, of which I bent over a small portion to show the under surface, and three unopened leaves, which had not reached the surface. The vernation of the leaves is involute, and before expansion they resemble exactly those of *Sagittaria latifolia* Willd. form *c*, of J. G. Smith's recent revision. The smallest of these leaves is but an inch long, with a stem two inches long. This leaf had barely emerged from the mud at the river bottom. I left some of the copious roots on the stock, and by coiling the peduncle, petiole

and roots, I made a good herbarium specimen. It took the rootstock some weeks to dry. It flattened gradually in the press, and is now three-sixteenths of an inch thick. It represents the original as well as a herbarium specimen can.

To illustrate the roots more fully, I made a specimen of rootstock and roots only, with the exception of an immersed leaf. The roots are about one-eighth of an inch wide at the base, and taper gradually. They are clothed with fine hairs, and average two feet in length. The immersed leaf was on a petiole five and one-half inches long, and, so, was nearly three feet under water. It was fully developed, dark brown on both sides, and generally round in outline, but with a very broad sinus, differing in this respect very much from the floating leaves.

Not the least interesting part of the plant is the fruit, while the manner of fruiting shows a wonderful adaptation of means to an end. The peculiar coiling of the stem, and the consequent drawing of the flower under water is an old story to tell, but the search and discovery of the fruit is ever a fresh one, for it is not always easy to find. On October 9, 1886, I was again in Concord, visiting the late Mr. Edw. S. Hoar, a good botanist, and an old friend of Henry D. Thoreau, with whom every spot in Concord is identified. We rowed on the river in search of the fruit of the water-lily. The air was still, the water perfectly clear for several feet in depth, and, as we moved slowly along over the places where in July the surface of the stream was white with the blossoms, I gazed down into the water searching for fruit. It is very strange what had become of the thousands of flowers. I found only two good fruits, and one almost eaten up by some water robber. Perhaps this last fact will partly explain their scarcity.

The fruits were from one to two feet under water, and one must know what to look for or he will certainly not be successful, even if the fruit is plentiful. The sepals and petals are still *in situ*, and the appearance is exactly that of a bud, for the pressure of the water keeps the sepals closed tight. The season of the year will determine whether it is a bud or fruit. The petals do not drop off, but slowly macerate. I found the fruit more easily in 1888, in Grassy Pond, Acton, Mass., but it was by no means abundant, although I know it is sometimes easily found.

If the surface of the water is ruffled, or the water itself is turbid, it can readily be seen how difficult the securing of the fruit must be. The stem coils in the middle or lower half

and part of the coils are to the right, and part to the left. The coils are about one inch in width, and in my specimens they vary from five to nine in number. The fruit varies in size from about an inch to three-quarters of an inch in diameter. One must be sure to put into a pocket on the sheet cross-sections of the rootstock and of the fruit. The latter will show the seeds with their sac-like aril covering, and their peculiar habit of lining the inner face of the carpels, instead of growing on a distinct placenta.

These furnishings to a herbarium show the wonderful apparatus needed to produce the delicate flower of the water-lily.

APOCYNUM ANDROSAEMIFOLIUM L. Spreading dogbane.

I have a peculiar case of teratology in this plant. Two leaves have grown into one. They have a common base, and the appearance is the same as if the leaves had lapped over on to each other for about three quarters of an inch. There are two midribs, which are about half an inch apart in the middle of the leaf, and each leaf has its own separate apex, the two points being three-eighths of an inch apart. The venation between the midribs is normal, except that the primary veins are not nearly so spreading as those on the other side of the midribs. They curve quickly and are almost parallel to the midrib, as if crowded, as they really are. It is hard to believe that there are not two separate leaves before one, partly overlapping. I collected the specimen June 16, 1894, in Weston, Mass.

TYPHA LATIFOLIA L. Common cat-tail flag.

To represent completely our common cat-tail flag, the plant must be visited early in the season, before the enveloping spathes or bracts have opened. My herbarium sheets show these early forms, and aid me in the following sketch. I visited a swamp in Cambridge, Mass., on June 26th, and found the plant in prime condition. I first secured a specimen, in which the inflorescence was completely invisible. One spathe enwrapped the staminate spike above. It was firmly attached at the base, and terminated in a leafy projection five inches long. Another spathe enclosed the pistillate spike, and the greater part of the staminate spike, and had a leafy projection just a foot long, overtopping the staminate spike by five and one-half inches. These leafy

terminations of the spathes resemble so closely the true leaves that I looked about for some time before I could discover the hidden inflorescence. I suppose that, had I visited the plant earlier still, the staminate spike, bract and all, would have been entirely enclosed by the female spathe.

Another plant showed the inflorescence a little farther advanced. The pistillate flowers were entirely free from the spathe which was but lightly attached to the base of the spike. I pressed it separately, for it became detached as I gathered the plant, and I have mounted it on the sheet near its original position, labelling it as belonging to the base of the female spike. The enveloping part of the spathe is three-quarters of an inch wide, and is light brown, as when I collected it, while the long leafy projection is a deep green, exactly resembling the color of the leaves. The male spike was just freeing itself from its spathe, and was shedding its pollen in copious showers. At intervals along the inflorescence, small bracts projected. On examining my various specimens, I find that the greatest number of bracts is six, varying in length from one-half to six inches. In one case a bract, half way up the spike, encloses the top of the spike, just as the bract or spathe at the base encloses the whole spike. The leaves of the plant have broad, sheathing bases, and there is a beautiful gradation from leaf to smallest bract. One can hardly afford to omit this feature from his herbarium. I pressed specimens showing every possible stage of inflorescence.

The fruit, though bulky, can easily be managed later in the season. A good way to supplement a specimen of the entire fruiting spike is to section one longitudinally, and mount it so as to show the inner face, with the stipitate fruit intact. The dark outer surface is then shown to be composed of the stigmatic surfaces on the ends of innumerable styles, while within are the copious hairs growing on the stipes. No dissection will be necessary to show this.

On August 14, 1886, at Rye Beach, N. H., I took up a whole plant to show the creeping rootstocks and the fibrous roots. My specimen has four stocks, the longest being one foot and two inches. The scaly nodes are about an inch and a half apart, and throw out but few roots. The stocks are about half an inch thick and, when fresh, were very white. The plant roots very freely from its base, the roots being

long, with coarse fringing hairs half an inch in length. To show the roots and rootstocks fully, the upper part of the plant must be sacrificed or mounted on another sheet. I do not believe in folding a plant so that parts will overlap and crowd too much, thereby sacrificing clearness of detail, just to bring the whole plant within the limits of a mounting sheet. Herbarium specimens, too often, exhibit two extremes of careless work. They are either too fragmentary or too crowded. The utmost endeavors should be used to make the best specimens possible, that our herbaria may be visited for their aesthetic as well as useful qualities.

Cambridge, Mass.